UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region I - EPA New England

Drafted Date: 09/19/2014
Finalized Date: 09/29/2014

SUBJECT: Partial Compliance Evaluation of Dragon Products Company LLC, Thomaston, Maine

FROM: Darren Fortescue, Air Technical Unit DF 9/29/14

THROUGH: Christine Sansevero, Senior Enforcement Coordinator, Air Technical Unit CMS 9/29/14

TO: File

I Facility Information

A. Facility Name: Dragon Products Company, LLC
B. Facility Location: U.S. Route 1, Thomaston, ME 04861
C. Facility Mailing Address: P.O. Box 191 Thomaston, ME 04861
D. Facility Contact: Michael Martunas, Environmental Manager
207 593 0147
E. Type of Source: Major
F: AFS Number: 2301300004
G: NAICS/SIC: 327310/3241

II Background Information

A. Date of inspection: September 9, 2014
B. Weather Conditions: Sunny, Mild, 70°F
C. US EPA Representative(s): Darren Fortescue, Mike Looney
D. State Representative(s): Kathleen Tarbuck, Roy Rike
E. Previous Enforcement Actions: On June 30, 2009, EPA issued Dragon Products Company, LLC ("Dragon") a Notice of Violation ("NOV") for violations of the non-attainment new source review ("NNSR") requirements of the Maine Department of Environmental Protection's ("ME DEP") State Implementation Plan ("SIP") and the Clean Air Act ("CAA"). Then on September 17, 2013, Dragon agreed to a settlement with EPA through a Consent Agreement and Final Order ("CAFO": Docket Number CAA 01-2013-0053) and agreed to pay a civil administrative penalty of $50,000.

III Purpose of Inspection

To resolve the violations alleged in the June 30, 2009, NOV, Dragon agreed to install and operate a baseline nitrogen oxides ("NO_x") monitor to determine what the baseline NO_x emissions from the facility's cement manufacturing kiln are. Dragon agreed to then conduct a demonstration period where it will operate an existing selective non-catalytic reduction ("SNCR") ammonia injection pollution control system at an ammonia to NO_x molar ratio of 1.0 and collect data describing the effective removal efficiency of the SNCR system. The data collected will then to be used to establish a 30-day rolling NO_x emission limit which will be integrated into the facility's operating permit.

The purpose of this inspection was to observe how the baseline NO_x monitor has been implemented, and to discuss with the facility how it plans to operate the SNCR system to achieve the required ammonia to NO_x molar ratio. In addition, EPA discussed how the facility plans to use the collected data to calculate the 30-day rolling NO_x emission limit.

IV. Facility Description

A. Facility History:

The Dragon facility, located in Thomaston, Maine, has been in operation for over 60 years. Ownership of the facility has changed several times in the past few decades and in 1988 it was incorporated under its present ownership, Giant Cement Holding, Inc., a subsidiary of Cementos Portland Valderrivas, S.A.

The plant is the only cement manufacturing facility in New England and produces Types I, II, and III cement, as well as light and dark masonry cement (Type N), Type S masonry cement, and a blended cement/limestone mortar mix.

B. Corporate Structure

The President of Dragon is Joseph Koch, while the Director of Environmental Affairs is Stephen Holt. The Facility's Environmental Manager is Michael Martunas (207-593-0147).

C. Number of Employees and Working Hours

The facility employs approximately 100 people and operates 24 hours/day, 7 days/week, with two 12-hour manufacturing shifts per day. The kiln usually shuts down once or twice per year with the main shut down occurring during the winter months, lasting about 3-5 weeks.

D. Process Description

Dragon quarries limestone on the Northern side of U.S. Route 1 and transfers it to the southern side by truck.

Raw limestone is initially crushed and mixed with iron ore and sand through a series of crushing, screening and blending processes to form clinker raw material. Several weigh scales are operated on-site to ensure that the materials are combined in proper ratios.

The clinker raw material passes through a preheater tower fitted with a bag house for particulate matter control and then a spray tower before passing through a series of 4 cyclones which dry the material. The material then passes through a calciner fitted with a SNCR system to reduce NO_x emissions before entering the kiln. The far end of the kiln and the far end of the calciner are both fired with petroleum coke. The operating temperature of the kiln is approximately 2,800 °F. The gasses generated in the kiln are fed back into the calciner and then travel in a reverse direction to the clinker raw material providing the heating and drying environment. The gasses pass through the cyclones and spray tower before exiting the system at the stack. The temperature of the kiln gasses decreases from 2,800 in the clinker kiln to 400 °F at the stack.

After the kiln a clinker cooler rapidly cools the clinker from 2,800 to 350 °F. The quick cooling restructures the crystal structure. The clinker is then ground and gypsum is added to form the final cement product.

E. Kiln Modifications and Alleged Violations

Dragon made the following modifications to the kiln system:

a. In the spring of 1995, Dragon made a number of physical changes to its cement kiln system, including, but not limited to, changes to the chain hanging pattern, the fuel injection method, and the clinker cooler.
b. In October 1995, Dragon obtained an air license amendment from ME DEP increasing the Thomaston facility's licensed production limit from 1464 tons of clinker per day to 1850 tons of clinker per day.
c. In 1997, Dragon replaced a draft induction fan in the cement kiln system.
d. In 2004, Dragon physically changed the cement kiln system by converting it from a wet process to a dry- process.

At the time of these changes, the Thomaston facility was located in a moderate nonattainment area for the pollutant ozone and in the ozone transport region ("OTR"). In the June 30, 2009 NOV, EPA alleged that each of the above modifications resulted in a net increase in emissions of NO_x equal to or greater than 40 TPY, and therefore triggered the major modification threshold applicable to major sources in the OTR. EPA alleged that Dragon had violated the Maine SIP, in particular certain requirements of Chapter 115 of ME DEP's Air Pollution Control ("APC") regulations. These requirements included, but were not limited to, the requirements to apply for and obtain a major new source review preconstruction license and to implement associated pollution controls to reduce NO_x emissions.

F. Establishing a 30-day Rolling Average Emission Limit for NO_x

To resolve the alleged violations documented in the June 30, 2009 NOV, the September 17, 2013 CAFO describes that Dragon is required to apply for and obtain air emissions license amendments from ME DEP, pursuant to the terms and conditions of Attachment 1 of the CAFO. Dragon is required to apply to ME DEP under Chapter 115 of the APC regulations for license amendments requiring measures to establish and formalize a 30-Day Rolling Average Emission Limit for NO_x for all periods of kiln operation. To achieve this Dragon is required to:

a. Within 120 days of the effective date of the CAFO, finalize the installation of a NO_x monitor ("inlet NO_x monitor") to continuously measure baseline, uncontrolled NO_x emissions from the kiln prior to the SNCR system. Following installation of the inlet NO_x monitor, Dragon is required to collect baseline uncontrolled NO_x emissions data, in addition to the NO_x emission data currently collected by the existing NO_x CEM ("outlet NO_x monitor") located in the stack, for a period of 9 months from the date of commencement.
b. Immediately following baseline data collection, Dragon shall begin to operate the existing SNCR system during all periods of kiln operation at a molar ratio of ammonia to NO_x of 1.0, for a period of no less than 90 operating days and no longer than a calendar year, while continuing to monitor NO_x using the inlet NO_x monitor and the outlet NO_x monitor.
c. Based on data collected during the demonstration period, Dragon shall seek approval of and operate in accordance with a 30-Day Rolling Average Emission Limit expressed in terms of pounds of NO_x per ton of clinker.
d. Dragon shall apply to the Maine DEP for amendment of Dragon's air emissions license to include an emission limit no less stringent than the approved 30-Day Rolling Average Emission Limit.

V. Inspection

A. Entry

On September 9, 2014, at 09:00 am, EPA inspectors Darren Fortescue and Mike Looney entered the Dragon facility located in Thomaston, ME and were met by Michael Martunas. Mr. Martunas led the EPA inspectors to a conference room where Kathlee Tarbuck and Roy Rike from ME DEP, and Michael Deyo, Dragon's consultant, were already present. The EPA inspectors presented their credentials and initiated an opening conference.

B. Opening Conference

Mr. Fortescue explained he and Mr. Looney were there to perform a partial stationary source CAA compliance inspection of the facility. Mr. Fortescue said the intention was to focus on the actions Dragon was required to take as described in Attachment 1 of the September 17, 2013 CAFO between Dragon and EPA. Mr. Fortescue then summarized the requirements as described in Section IV. F.

Mr. Martunas and Mr. Deyo then provided a description of the cement manufacturing process as described in Section IV. D. Mr. Martunas also provided the process flow diagrams found in Section VII. Attachments (Diagrams 1 and 2).

Mr. Deyo indicated on Diagram 1 where the baseline inlet NO_x monitor had been installed (see location "Kilnloq probe location Lower Calciner" marked on Diagram 1). Facility representatives said this location was after the kiln and before the SNCR system and they described the environment as challenging given that it is extremely dirty and hot (between 1,500 and 2,000 °F). Mr. Martunas said the cement equipment design company FLSmidth had designed and installed an "ABB" NO_x monitor and specialist probe system for the application of measuring inlet NO_x monitor concentrations. Mr. Martunas described the probe as being both air and water cooled. It addition, the probe utilizes two filtration components to filter the sample before analyzing it for NO_x. Mr. Martunas explained that due to the challenging environment, Dragon had to implement routine daily and monthly maintenance activities of the probe system, such as cleaning filters and changing O rings.

Mr. Looney asked for the specific dimensions of the calciner at the sample point. He also asked if the sample location met the requirements for a sample location as required by 40 C.F.R. Part 60, Appendix B, Performance Specification 2-Specifications and Test Procedures for SO2 and NO_x Continuous Emission Monitoring Systems in Stationary Sources ("PS2"). Mr. Martunas offered to supply the specific information in a follow-up email.

Mr. Fortescue asked what the installation and final commissioning dates were for the inlet NO_x monitor. Mr. Martunas said the monitor was installed on December 16, 2013. He said the facility had then shut down for an annual maintenance break during the winter months and restarted on February 17, 2014. FLSmidth was involved in the final installation of the monitoring probe and commissioning of the system, which included performing a 7 day calibration drift test and a relative accuracy test audit ("RATA"). Mr. Martunas said the inlet NO_x monitor commissioning was completed on March 5, 2014 and baseline data collection started on March 6, 2014.

Mr. Fortescue asked when the facility intended to start the demonstration period described in Section IV. F. b. and how was this to be implemented. Facility representatives said the demonstration period was due to start on December 7, 2014, immediately following the 9 month baseline data collection period, as required by Appendix 1 of the CAFO. Facility representatives said the calciner already had a SNCR system in place which was being used to meet the current state limit documented in the facility's Title V permit. Facility representatives said the final implementation involved adding a programmable logic controller ("PLC") to the inlet NO_x monitor data collection system to provide a feedback loop to be able to automatically control the injection rate of ammonia in the SNCR system. The CAFO requires the facility to maintain the ammonia to NO_x ratio at 1.0. Mr. Martunas said the PLC was not yet installed.

Mr. Fortescue noted that the start date of the demonstration period appeared to be occurring a few weeks before the facility's planned winter shut down for maintenance. Facility representatives confirmed this was the case and indicated that it seemed to make sense to continue the baseline data collection period up until the shutdown and then start the demonstration period after the shut down; however, they were concerned that this might violate the terms of the CAFO. Mr. Fortescue said he would follow up on this question when he was back in the office.

Mr. Fortescue asked how the collected data was going to be reduced and used to calculate NO_x concentrations and mass rates in lb/hr and lb/ton of clinker produced. Mr. Deyo said the inlet NO_x monitor was currently collecting 15 second data points and the facility planned to initially reduce the data to hour averages to be used in calculations. Mr. Deyo said that Appendix 1 of the CAFO required the facility to report explanations for missing data and expressed concern over the burden of having to report an explanation every time a valid 15 second sample was not achieved. Mr. Fortescue suggested that it may be possible for them to follow the requirements of CFR Part 60 regarding the calculation of a valid operating hour and that as long as they were able to meet those requirements it may be appropriate to not have to explain missing data at a smaller resolution. Mr. Deyo agreed and suggested that it would make sense for the facility to calculate 1 hour averages from the data using the requirements documented in 60.13(h)(2) and only document reasons for missing data for periods of time where they were unable to fulfil those requirements. Mr. Fortescue said he would discuss the possibility with other EPA personnel and get back to the facility on what would be acceptable under the terms of the CAFO.

Facility representatives described that the flow used in calculations was being measured at a location just above the main spray tower (hand marked as 1 on Diagram 1). Note this is different from the location of the NO_x sampling points. Mr. Fortescue asked facility representatives how they knew this was an accurate representation of the flow through the stack and Mr. Martunas said the flow at this location matched the stack flow measured during routine RATAs. Facility representatives also said the clinker production rate was relatively constant (at approximately 100 tons/hour) and was calculated using a site specific conversion factor based on the input of raw materials and the chemistry performed in the clinker production process. Facility representatives said all raw materials were weighed as they entered the process and the conversion factor currently being used was 1.6984 tons of raw material per ton of clinker.

Facility representatives presented data showing that the current NO_x emission rate was approximately 5 lb/ton of clinker and also explained that the actual rate varied depending on the method of calculation. The facility representatives explained the variances between methods of calculation were observed due to small amounts of missing data being scaled up to daily emission rates which induced rounding errors. Mr. Fortescue suggested that the facility document the exact methods of calculation and forward them to him so he could review and comment on them.

Mr. Fortescue asked if there had been periods of time during the baseline data collection period where the facility had not been injecting ammonia into the SNCR system and if so he asked if it was possible to see data for those periods. Mr. Deyo produced 15 second NO_x CEMS data for a period when ammonia injection was not occurring. Mr. Fortescue noted the inlet NO_x monitor data did not exactly match the outlet NO_x monitor data. Mr. Fortescue suggested that this maybe a result of the residence time in the cement production system; however, he suggested that it would be useful to average the data over longer periods of time to determine if there was any correlation between the two CEMS that could be used to identify if there were any systematic effects offsetting data. Mr. Deyo performed a quick daily average calculation between the data and indicated the difference for the data presented was the inlet NO_x monitor data was 10% lower than the outlet NO_x monitor data averaged over a 24 hour period for that particular day. Mr. Fortescue suggested it would be useful if the facility identified other periods of time where ammonia injection was not being performed and repeat the calculation to identify if this trend was constant or not. Mr. Fortescue asked the facility to email some daily spreadsheets of raw data for periods when ammonia injection was not occurring and Mr. Deyo committed to doing so.

Mr. Fortescue asked how the facility was going to implement the PLC ammonia injection feedback loop with respect to any algorithm to fine tune the system to maximize the NO_x removal efficiency of the SNCR system. The facility representatives said they were not planning on adding any offsets or adjustments. They said they were planning on using the direct data from the inlet NO_x monitor and injecting ammonia in a ratio of 1.0 according to those data. Mr. Fortescue said that it might be possible to adjust this and improve the removal efficiency if it was found that there was a systematic offset in the data being collected by the inlet NO_x monitor. Facility representatives said that if this was something EPA wanted to see happen then EPA would need to let the facility know.

C. Facility Walkthrough

The group then performed a facility walkthrough concentrating on the equipment being used to meet the requirements of the September 17, 2013 CAFO.

Initially the group approached the main facility building from the outside, where facility representatives pointed out the main stack, preheater and main spray tower (Photo 1).

The group then entered the main building and visited the 6th floor where they were shown the calciner (Photo 2) and the inlet NO_x monitor CEMS. Mr. Fortescue noted that the CEMS was reading a NO_x concentration of 1258.8 parts per million ("ppm"), an O_2 concentration of 2.4%, a CO concentration of 0.1% and an SO_2 concentration of 0.0 ppm. On a platform above the CEMS shed the group was shown a probe which Mr. Martunas said was the inlet NO_x monitor probe (Photo 4). Mr. Martunas then removed the probe to show the group what the sample environment was like (Photo 5).

The group then visited the 7th floor where Mr. Martunas showed them what he described as the SCNR system attached to the body of the calciner (Photos 6 and 7).

On the next level up Mr. Martunas showed the group what he said was the sample location for the flow monitor attached to the main spray column (Photo 8). In addition Mr. Martunas showed the group what he described as the final stack CEMS shed. Mr. Martunas said the shed contained both a primary and secondary set of CEMS systems which included the outlet NO_x monitoring system. Mr. Fortescue noted that the shed contained two sets of CEMS monitors (Photos 9 and 10). Mr. Fortescue noted that the CEMS described as the primary CEMS by Mr. Martunas was reading a NO_x concentration of 6.52 ppm, a CO concentration of 0.390 ppm and an SO_2 concentration of 0.0344 ppm. Mr. Martunas later confirmed that the NO_x reading indicated a dilution of 100 and the actual reading at the time of inspection was 652 ppm.

Mr. Martunas said the facility was in the process of upgrading the final stack CEMS to a new FDIR system to add additional parameters. Mr. Martunas said this new system was planned to be installed by July 2014; however there had been delays and the project was due to be completed by December 2014. Mr. Martunas said the new system would be able to monitor additional parameters including but not limited to particulate matter, mercury and ammonia.

D. Close-Out Conference

Before performing the final closeout conference Mr. Fortescue asked to see the logbooks documenting QA activities being performed on the baseline monitor. Mr. Martunas produced the logbooks for review. Mr. Fortescue noted that the instrument NO_x span was documented as being from 0 to 4000 ppm and that the cylinders being used to perform daily drift checks had NO_x concentrations of 0 and 1802 ppm. Mr. Fortescue also noted that the results of the last two daily calibration drift checks were:

- For 9/8/14; calibration gas 1802 ppm, result 1786 ppm; calibration gas 0 ppm, result -19 ppm.
- For 9/9/14; calibration gas 1802 ppm, result 1852 ppm; calibration gas 0 ppm, result 30 ppm.

Mr. Martunas said that cylinder gas audits were also being conducted on a quarterly basis; however Mr. Fortescue did not review the results for one of these audits.

Mr. Fortescue then thanked the facility representatives for their time. Mr. Fortescue then listed the action items resulting from the inspection as:

- Mr. Fortescue would follow up to see if it was possible to allow an extension to the baseline period to coincide with the winter shutdown for the facility;
- Mr. Fortescue would follow up to see if it would be acceptable for the facility to calculate 1 hour average data values using the requirements documented in 60.13(h)(2) and to only report missing data points if those requirements could not be met;
- Facility representatives would document how they proposed to perform calculations to determine the emission rates required by the CAFO and email the information to Mr. Fortescue for review;

- Facility representatives would provide EPA with baseline raw data for two separate 24 hour periods of time where the SNCR was not being run, in advance of the final report.
- Facility representatives would analyze additional baseline raw data for periods of time when the SNCR was not being run to try to identify if a consistent trend or offset may be occurring in the data being collected from the inlet NO_x monitor.

VII. Attachments

A. Process Diagrams

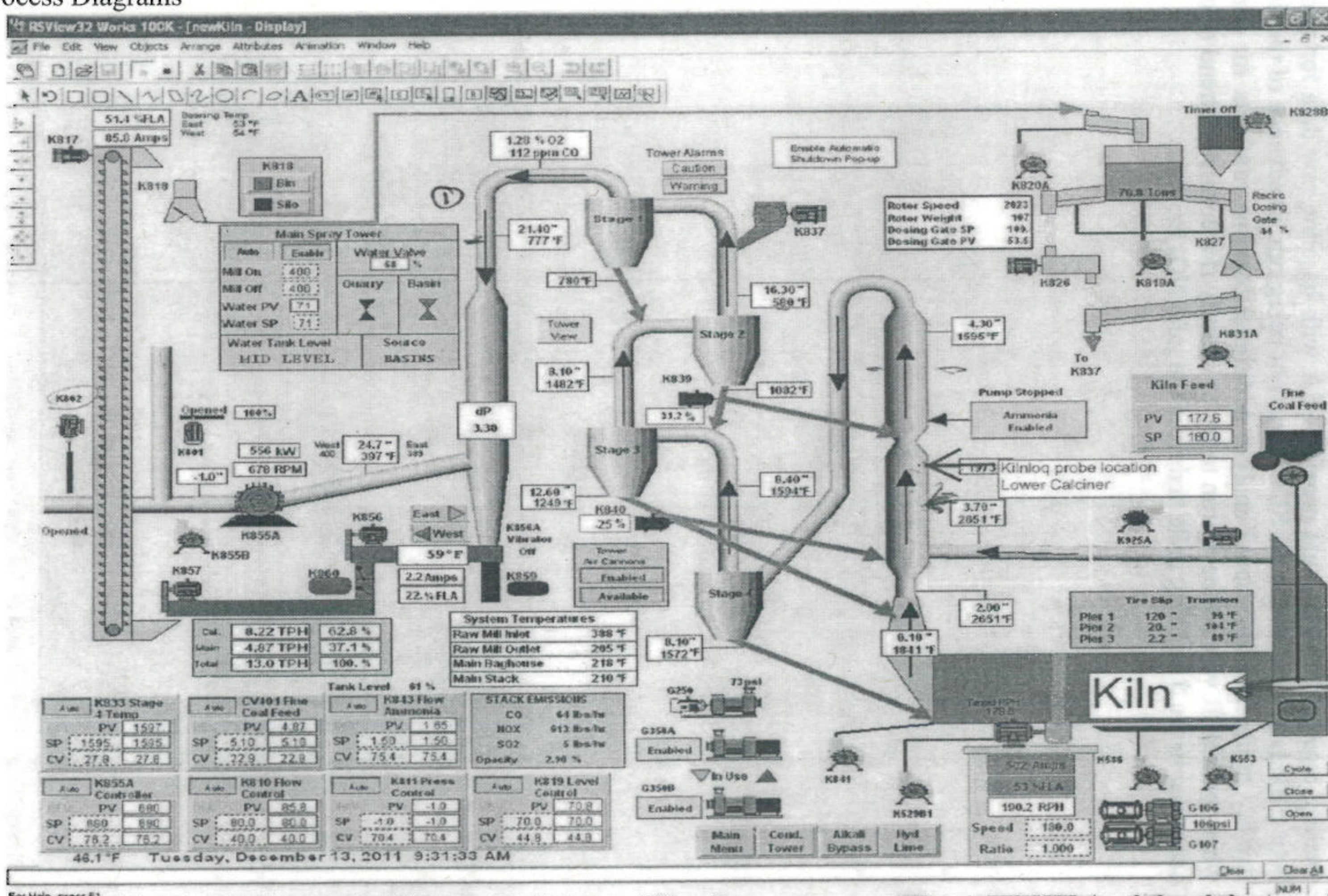

Diagram 1: Process flow diagram for clinker production at the Dragon facility.

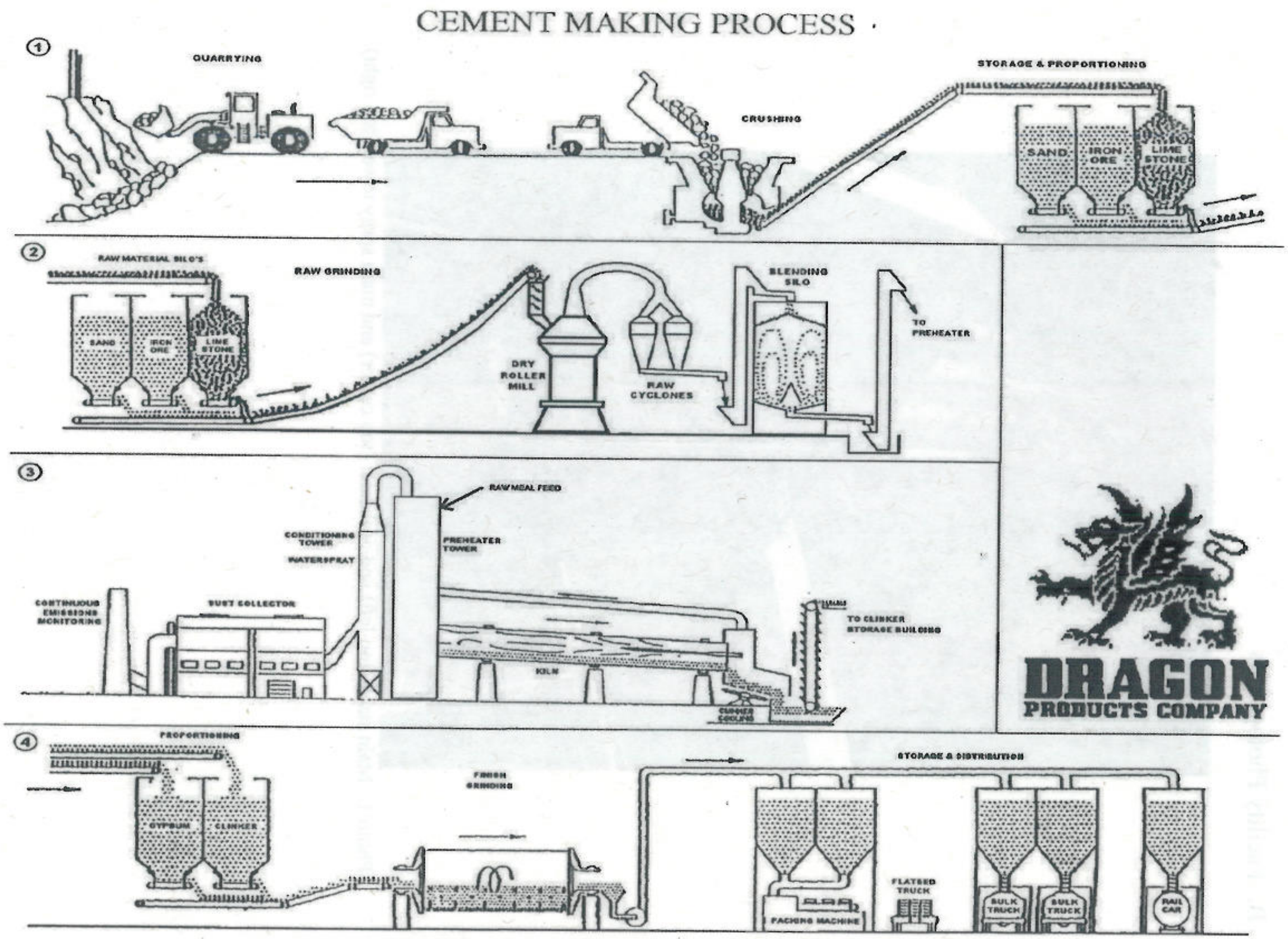

Diagram 2: Process elements of cement production at the Dragon facility.

B. Facility Photographs

Photo 1: Main stack (top left) and preheater (top center) and main spray tower (top right).

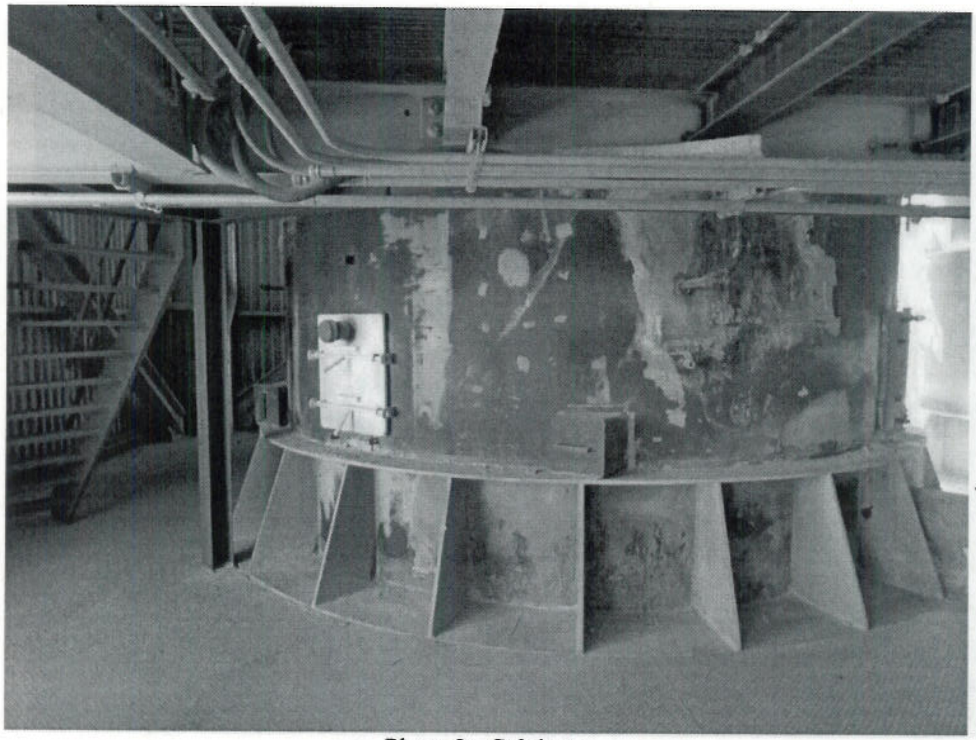

Photo 2: Calciner.

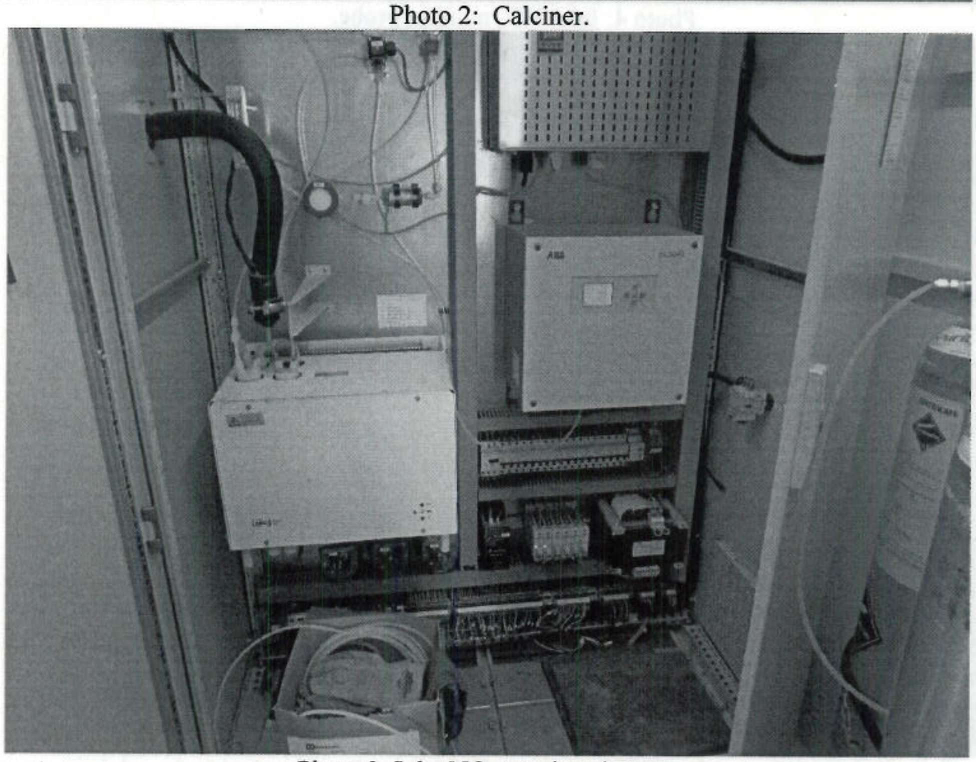

Photo 3: Inlet NO_x monitor CEMS.

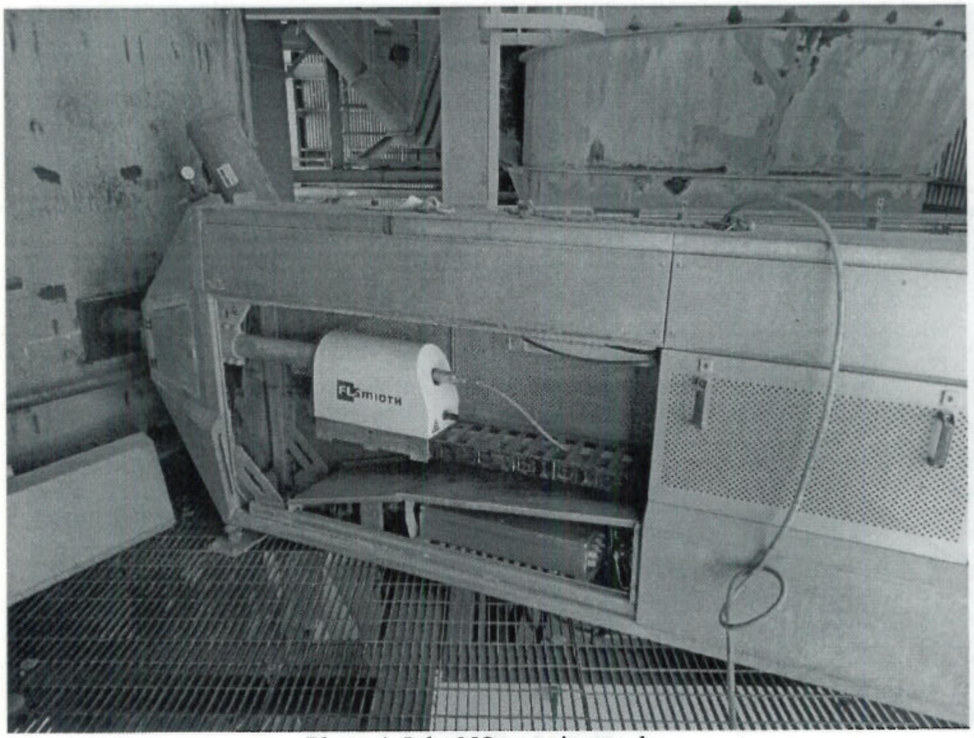

Photo 4: Inlet NO_x monitor probe.

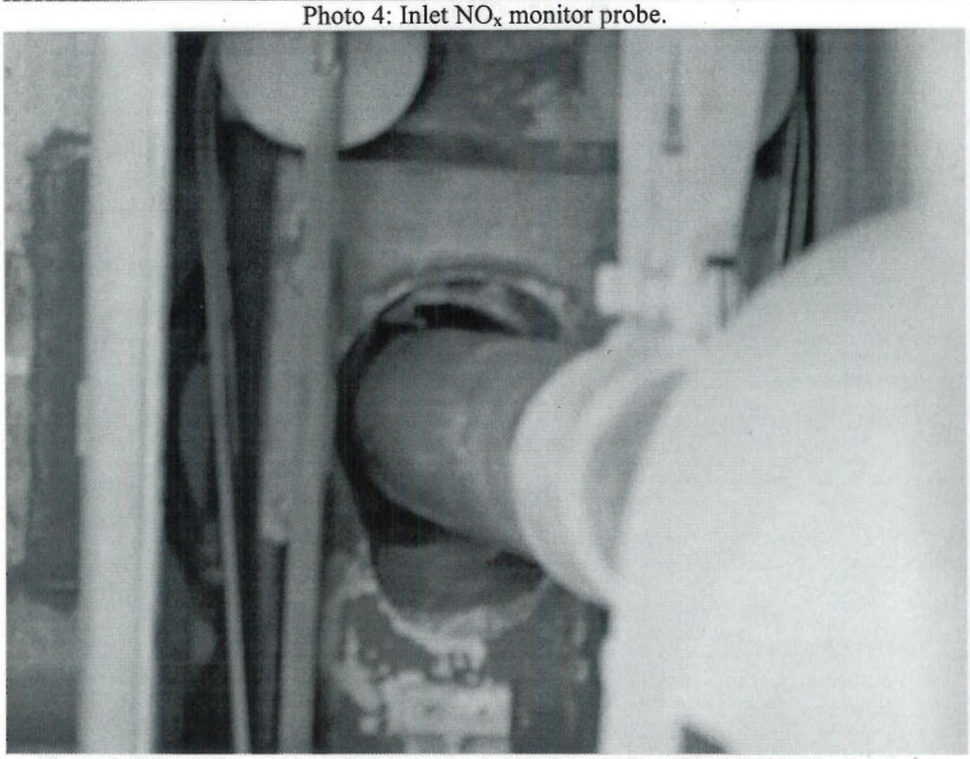

Photo 5: Inlet NO_x monitor probe removal showing environment inside the calciner.

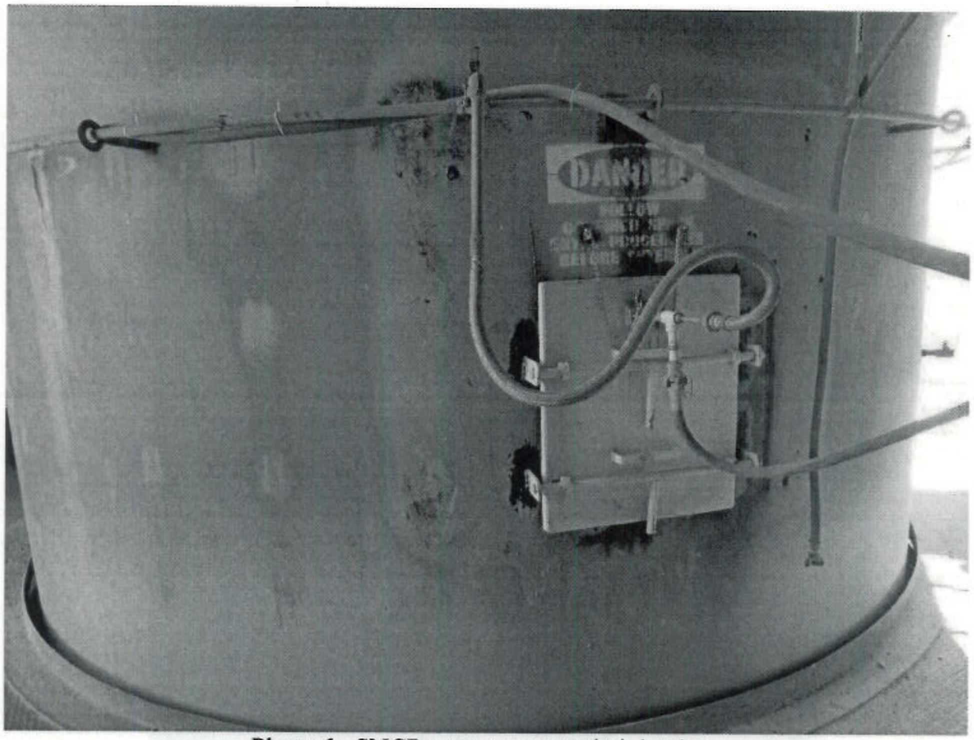

Photo 6: SNCR system ammonia injection.

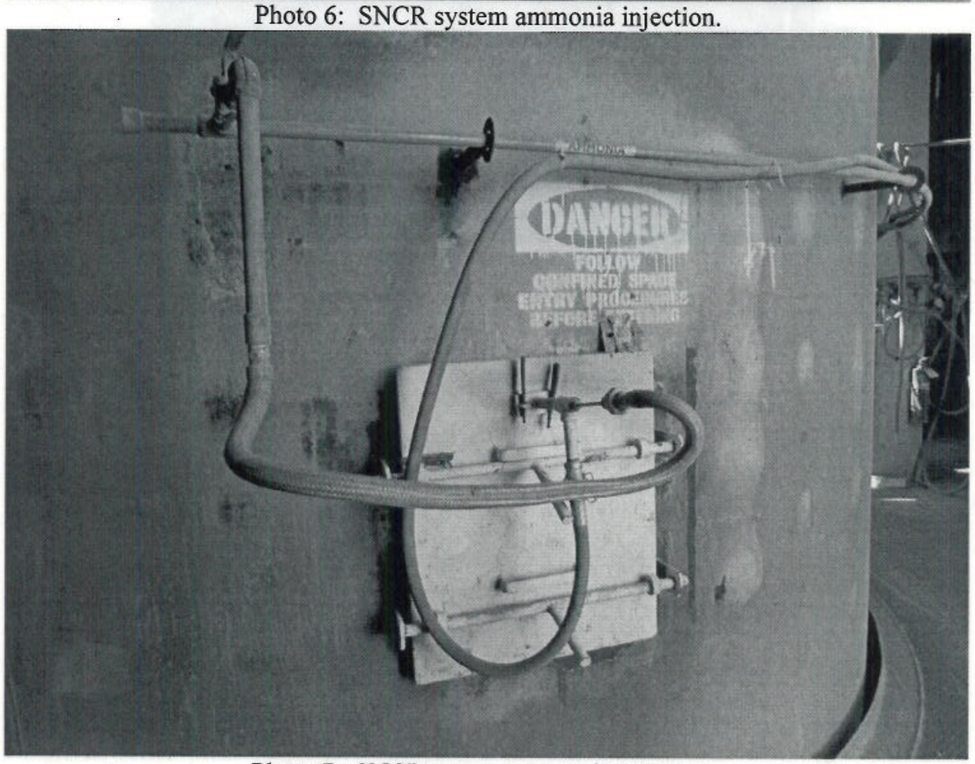

Photo 7: SNCR system ammonia injection.

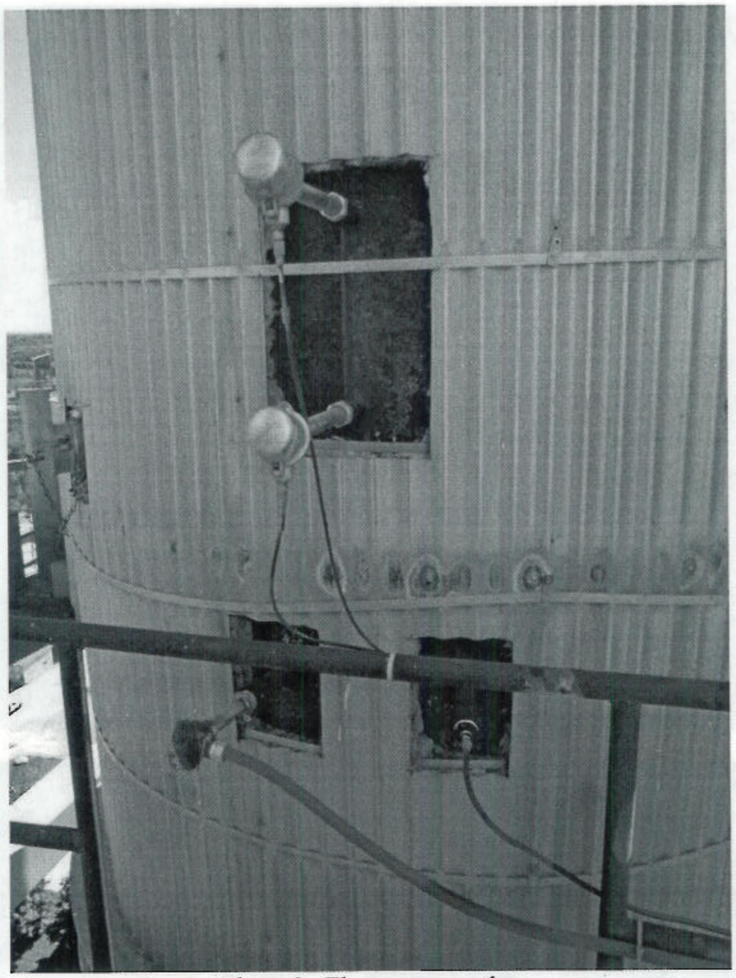

Photo 8: Flow meter probe.

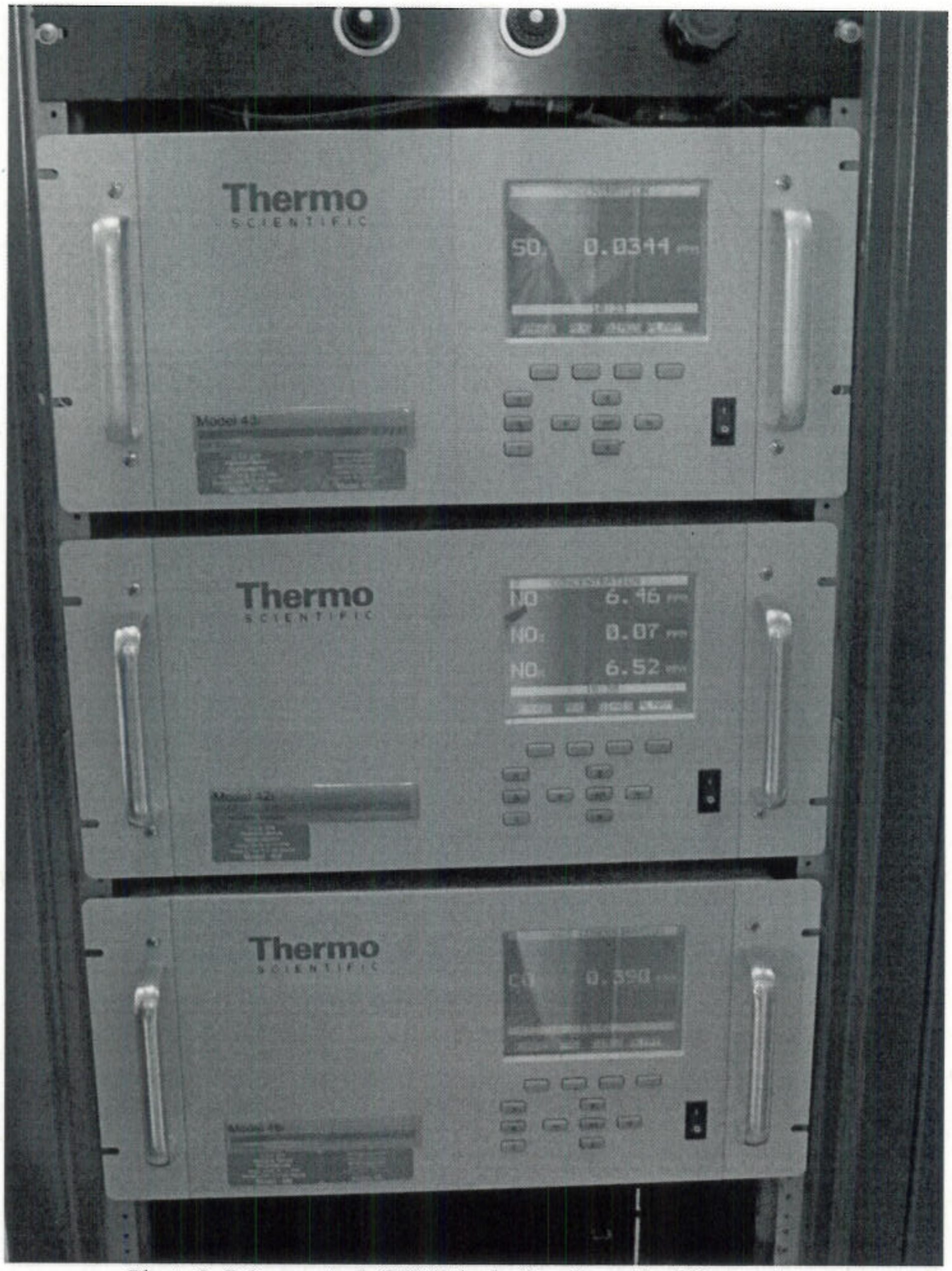

Photo 9: Primary stack CEMS including the outlet NO_x monitor.

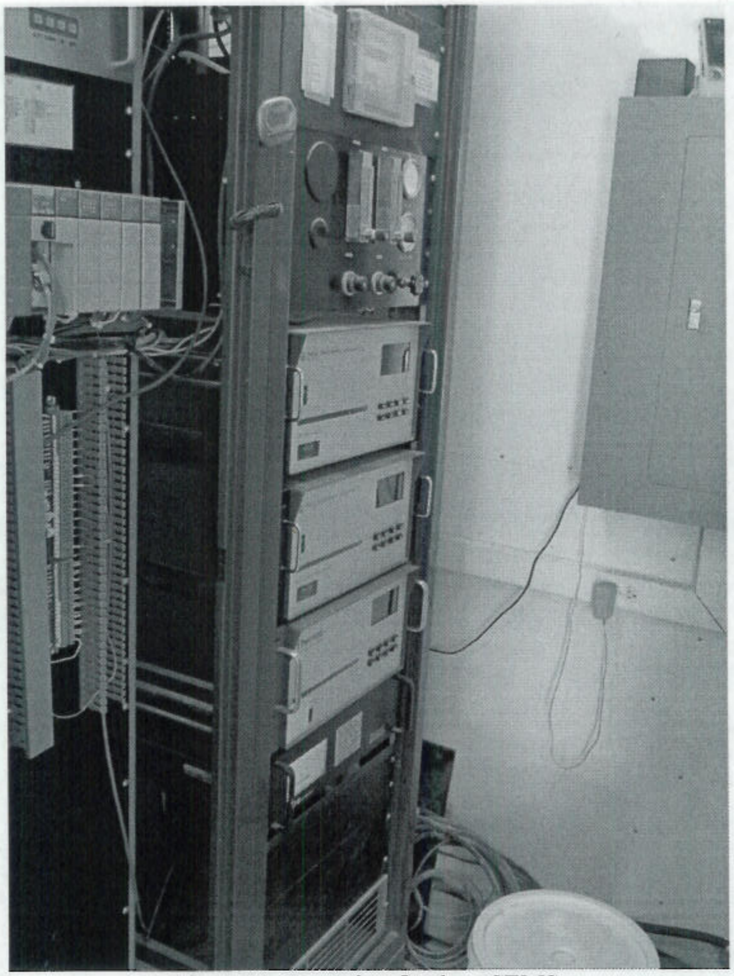

Photo 10: Secondary/backup CEMS.